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ABSTRACT

This paper summarizes the initial evaluation of an experimental teacher education project for juniors in mathematics education. The project was conducted in five junior high schools and five elementary schools in two quarters of the year 1970-71. In the fall quarter, each student teacher tutored an eighth grade student twice a week and spent some time observing regular teachers; in the winter quarter, the student teacher served as a teaching assistant on two half-days a week. Various tests of mathematical ability, personality, and attitude to teaching were administered to the student teachers at different times during the project. Significant gains are reported on several scales. The eighth grade students were given attitude and achievement tests; and significant differences between those who did and did not receive tutoring are reported for some of the attitude scales. The student teachers and the elementary school teachers completed questionnaires related to the project, and the responses indicated a generally positive reaction to the project. (MM)

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Teacher Education and Evaluation

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A Formative Evaluation of an Experimental Teacher Education Project for Juniors in Mathematics Education

This study was the initial evaluation of an experimental teacher education project for juniors in mathematics education at the Ohio State University. The project was conducted in five junior high schools during the fall quarter and five elementary schools during the winter quarter of the 1970-71 academic school year. This study had three purposes: 1) the identification and evaluation of significant variables related to the juniors, 2) the investigation of the effect of tutoring upon the achievement of eighth graders, and 3) the determination of relationships between selected teacher variables and success in tutoring.

During the first quarter seventy-two participants spent approximately three class periods, twice a week, in a junior high school. Each tutored an eighth grade student in mathematics for one period and was free to explore the school for the other two periods. The eighth graders who were tutored were randomly chosen from a list of students prepared by the eighth grade mathematics teachers. Those eighth graders on the list who were not tutored formed the control group. Concurrent with the school experience each project member attended a seminar twice a week. Some of the tutoring sessions were videotaped and reviewed during the seminar.

During the second quarter sixty-one juniors spent approximately two and one-half hours, twice a week, in an elementary school. Each was

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assigned to a particular teacher and served as a teaching assistant. Their exact duties were determined by the cooperating teacher and the junior. All participants attended a seminar twice a week.

The particpants were measured at the beginning and end of the first quarter and the end of the second quarter as shown in Table 1. The instruments administered at these times were the Teaching Situation Reaction Test (TSRT), (Duncan and Hough), Index of Adjustment and Values (IAV), (Robert Bills), Mathematics Teaching Inventory (MTI), (experimentor designed), and three questionnaires. Massie's Contemporary Mathematics Test for Teachers was administered at the beginning of the first quarter. The eighth graders were tested at the beginning and end of the first quarter. They were given the Comprehensive Tests of Basic Skills (CTBS), Arithmetic Section, and an Attitude Inventory constructed using selected items from the NLSMA studies. The elementary teachers completed a questionnaire at the end of the second quarter. During the first quarter each project member kept a log of his activities in the junior high school.

Each hypothesis concerning significant differences in mean scores and variances of the project members was tested using a t-test for correlated means and variances. Each variable was evaluated over the entire project and each quarter individually. In order to compensate for the problem of multiple comparisons, the critical values of t were adjusted using the procedure developed by H. Scheffe'. Only those juniors who had complete data over the entire two quarters of the project were used in testing the comparisons. The hypotheses concerning differences between the experimental and control groups of eighth graders were tested using an analysis of covariance. Pre-test measures were used as covariates

for post-test measures. A correlation matrix of fifty-three identifiable variables was computed. Correlations between the project member's pre-first quarter measures and success in tutoring as defined by gain scores in computation ano the subscales of the Attitude Inventory were also computed.

TABLE 1

SUMMARY OF DATA COLLECTION

Instruments	J_1 Quarter		J_2 Quarter	
Project Members				
Questionnaires	X	X	Z	X
TSRT	X	X	Z	X
MTI	X	X	Z	X
IAV (Self)	X	X	Z	X
IAV (Jr. Highs)	X	X		
Contemporary Math Test	X			
Eighth Graders				
CTBS (R)	X			
CTBS (Q)		X		
Attitude Inventory	X	X		
Elementary Teachers				
Questionnaire				X

X - data gathered on all individuals participating in the Project

Z - data gathered on those individuals who entered the Project the beginning of the J_2 quarter

A summary of the significant differences for the project members is listed in Table 2. The results of the analyses for the project members revealed a significant increase in the Teaching Situation Reaction Test for the second quarter and the entire project. The participants also increased significantly on the Composite score, Perception of Student-Teacher Roles, and Strategies of Teaching Mathematics subscales of the Mathematics Teaching Inventory for both quarters and the entire project. The participant's measure of self-concept on the Index of Adjustment and

Values increased steadily over the two quarters but did not reach significance. There was no significant difference in variance for any of the measures.

TABLE 2

SUMMARY OF SIGNIFICANT FINDINGS FOR PROJECT MEMBERS WITH LEVELS OF SIGNIFICNACE

Measure	Comparisons		
	Pre J_1 - Post J_1	Pre J_2 - Post J_2	Pre J_1 - Post J_2
TSRT	NS	.01	.05
MTI			
Composite	.01	.01	.001
Perception of Student-Teacher Roles	.05	.05	.001
Strategies of Teaching Mathematics	.001	.01	.001

These results seem reasonable when one looks at the experiences of the juniors for the two quarters. The emphasis for the first quarter was on the individual. The project members were concerned with how to convey mathematical concepts to the students they were tutoring. The work for the second quarter was more classroom oriented. The juniors became involved with classroom teaching situations and were concerned with the strategies used in presenting mathematical ideas to small groups and the entire class.

Table 3 gives a summary of the differences between the experimental and control groups of eighth graders. The tutored group scored significantly higher on the Math vs. Non-Math and Facilitating Anxiety subscales of the Attitude Inventory. This result seems to indicate that tutoring gave these students a better image of mathematics in that they were more aware of its importance in relation to other school subjects. The tutoring experience

also seemed to create more self-confidence in the students. The tutored group had a greater increase in computation scores but the difference between the experimental and control groups was not significant.

TABLE 3

SUMMARY OF DIFFERENCES BETWEEN EXPERIMENTAL AND CONTROL GROUPS OF EIGHTH GRADERS

Measure	Level of Significance
Computation	.31
Attitude Inventory	
Math vs. Non-Math	.05
Pro Math Concept	.36
Actual Math Concept	.69
Ideal Math Self-Concept	.04*
Facilitating Anxiety	.04
Debilitating Anxiety	.57

* - Interaction of tutoring and schools was significant at the .05 level.

There were no significant correlations between the project member's pre-first quarter measures and success in tutoring as defined by gain scores in computation and the subscales of the Attitude Inventory. The results of the total correlation matrix for the fifty-three variables identified in the study seemed to indicate that the instruments correlated with themselves for the three times they were administered.

The responses to the questionnaires added another source of data. The desire to work in the schools and participate in "practical and relevant" experiences was quoted by two-thirds of the project members as the reason for choosing the project over the "traditional" program. About twenty per cent of the responses indicated dissatisfaction with the "traditional" program.

Tutoring and videotaping were the two features of the first quarter cited as contributing the most to the project. The greatest benefit of the tapes in the eyes of the project members was that they helped to point out mistakes and bad habits that occured during the tutoring sessions.

The contact with teachers and students and the ensuing interaction was listed by half of the juniors as the most beneficial part of the program. The greatest change, according to half of the responses, was in their view of teaching. The participants discovered that there is more to teaching than they previously thought. The change they perceived in themselves as a result of the elementary school experience was taking a personal interest in children and respecting them as individuals.

In response to a question of what should definitely not be changed, slightly less than one-half said the school experience and in particular, the work in the elementary school should remain. Tutoring and the use of the videotape recorder were also mentioned by more than twenty-five per cent of the participants. One quarter also liked the freedom they were given and the loosely structured seminars with free discussion.

One activity about twenty per cent felt should be changed was the amount of unstructured time during the first quarter. They felt this time was beneficial at first but became boring and worthless.

Table 4 summarizes the results of the log sheets for the unstructured time during the first quarter of the project. It was evident that the project members considered classroom observation as the major activity of the free time. About sixty per cent of this time was spent observing or working on an activity related specifically to tutoring. It was also evident that many juniors did not act upon a suggested activities list for the unstructured time that was handed out at the beginning of the project.

TABLE 4

SUMMARY OF LOG SHEETS - PERCENTAGE OF TIME FOR EACH ACTIVITY

Activity	%	Activity	%
Observations		Miscellaneous	
Math	24.36	Nothing reported	7.01
Science	2.15	Library	3.07
History	3.44	Testing	5.27
English	3.71	Videotape set up	2.25
Other	9.76	Own school work	1.70
Subtotal	43.42	Neighborhood	0.50
		Extra tutoring	1.19
Tutoring Activities		Conference	0.37
Planning	7.97	Completed log	0.37
Observing	3.67	Read proj. materials	0.46
Observe videotape	2.20	Subtotal	22.19
Student's file	3.02		
Subtotal	16.86		
Discussions			
Jr. High students	0.82		
Teachers	5.13		
Counselors	1.74		
Other staff	0.55		
Project members	9.30		
Subtotal	17.54		

On the questionnaire for the elementary school teachers, slightly over eighty percent said that the junior freed her to do things she might not have been able to do otherwise. All but four teachers said the project members were a help in the classroom. Concerning the strengths of the project, one-third of the teachers not only saw it as aiding the college students but also as benefiting the faculty and students of the participating schools. Another strength listed by almost two-thirds of the teachers was the practical experience gained by the juniors in handling a classroom.

The results seem to indicate that the experiences provided a realistic framework and point of reference from which the project members could apply the theoretical content of their courses. The results of the tutoring seem to indicate that the eighth grade students acquired a better image of mathematics and greater self-confidence. The responses from the questionnaires seem to relate a positive reaction towards the program from both the participants and cooperating teachers.

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